UTStarcom Carrier Ethernet

MPLS-TP

목차

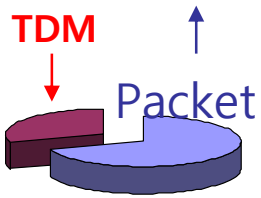
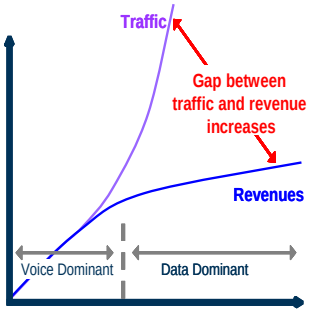
1. MPLS-TP 개요, 특징

2. UTStarcom TN 소개

3. 구축 사례

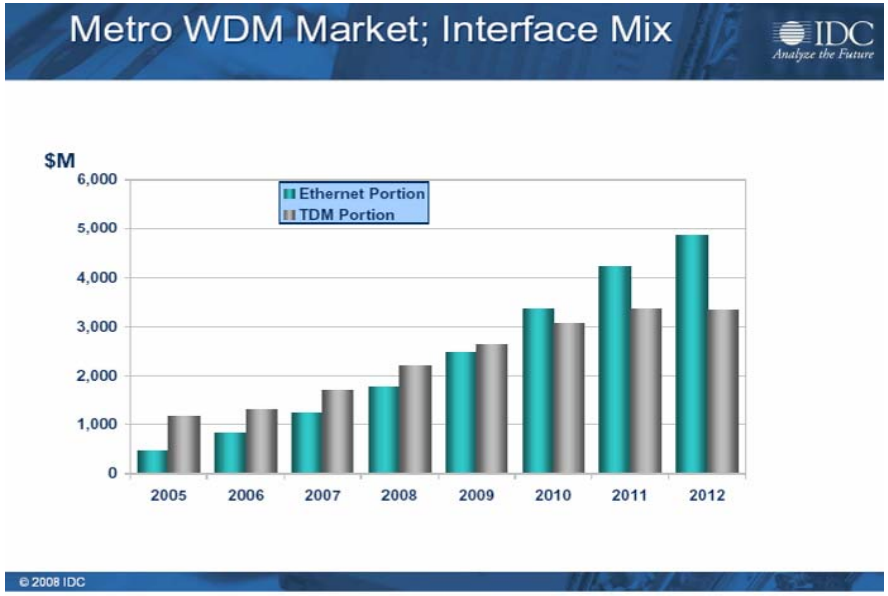
1. MPLS-TP 개요

출현 배경

현 안 점	MPLS -TP Solution
 **패킷 트래픽의 증가에 따른 대응 방안** : 광대역 가입자의 급진적인 증가로 인한 초고속 패킷 전송시스템에 대한 요구 증가	• 기존의 SDH/SONET 에서 제공하는 망의 생존능력을 보장, 네트워크상에서 Ethernet 및 TDM,ATM, SDH/SONET신호전송이 가능한 패킷기반의 새로운 광전송 시스템
 **서비스 트래픽 증가에 따른 대역폭 개선** : 네트웍의 복잡성, 확장의 어려움, 고가의 유지보수. 서비스 트래픽의 용량 계속 증가	• 패킷망에 대한 멀티서비스지원은 시스템 재투자에 대한 필요성을 감소시킴 • 단순화된 네트워크 구조 및 뛰어난 OAM기능은 네트웍 유지보수에 대한 부담을 경감시킴 • 뛰어난 확장성 및 유연성을 제공
 Network Convergence: 시스템의 단일화 추세 및 , 유무선 통합서비스, 통방 융합 서비스 , IP 망 서비스 증가	• 단일 플랫폼 시스템에서 여러 가지 서비스 지원 • IP기반의 서비스를 지원하는 장비 모두 수용 • 서비스별 차등 서비스 제공

1. MPLS-TP 개요

시장 동향



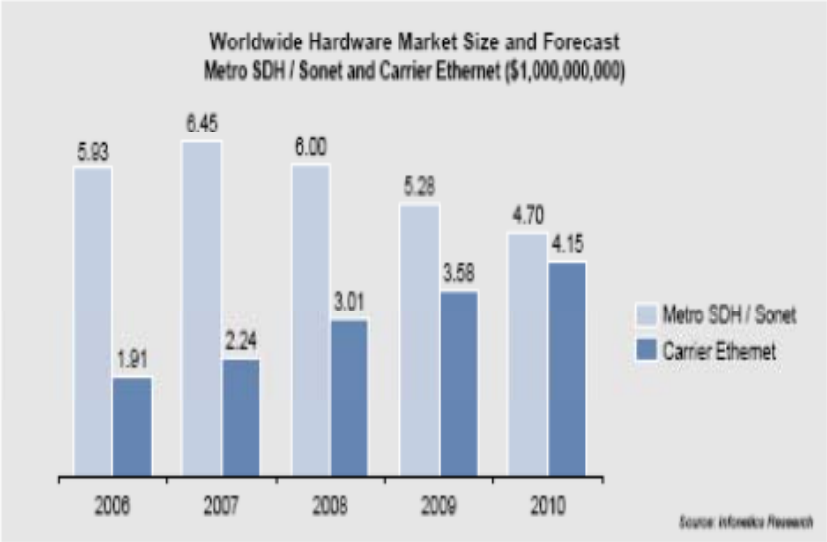
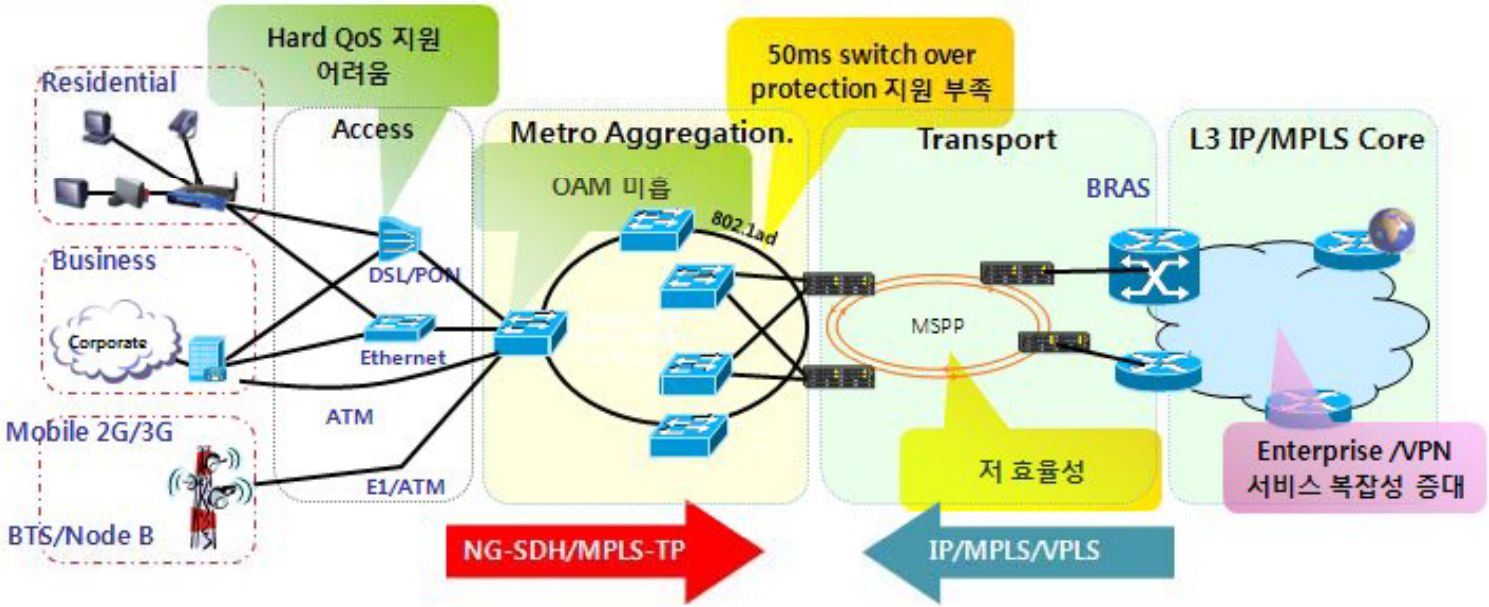


Figure 1: Evolution of Metro SDH/Sonet and Carrier Ethernet markets

- Ethernet 발전 : 10G/40G/100Gbps Ethernet
- 주요 시장 조사 기관 : WDM (DWDM, ME, MSPP) 등의 시장은 감소하고 Carrier Ethernet (True Carrier Ethernet) 즉, All IP 망으로 차세대 망이 구축 될 것으로 예상
- 주요 장비 제조사 : 주요 전송 벤더 및 네트워크 벤더에서는 2000년 초부터 PBB, PBB-TE 와 T-MPLS, MPLS-TP 기반의 Carrier Ethernet 장비를 출시하여 다수의 서비스 사업자, Triple Player, Metro Ethernet 망 등에 구축

1. MPLS-TP 개요

망에서의 기술적 이슈사항



Transport Vendors

- Transport based technology
  - Telecom world
  - Connection-oriented, fully controlled by Carrier
- NG-SDH, T-MPLS, MPLS-TP, RPR
  - Metro aggregation

Router/Switch Vendors

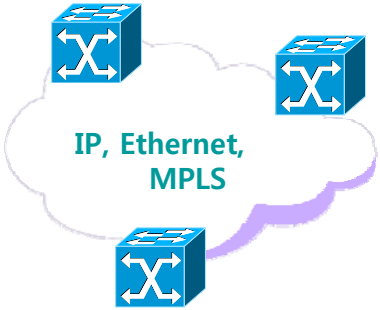
- Router/Switch based technology
  - Internet world
  - Connectionless, loosely controlled, "p-to-p","plug & play"
- IP/MPLS/VPLS
  - Metro core to Metro aggregation

1. MPLS-TP 개요

MPLS-TP (PTN)의 구성

Packet Network

- Statistical multiplexing, flexible transport containers
- Service aware
- Advanced QoS
- Scalable
- Cost effective (Ethernet based)



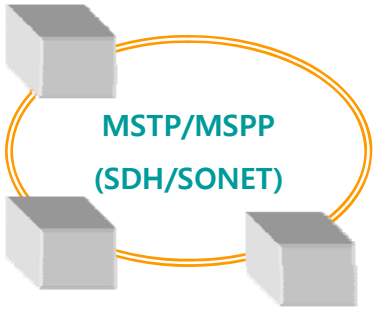
Convergence

Best of both worlds

Packet Transport Network

Transport Network

- Connection Oriented
- High clock accuracy
- Resilient (50ms switch-over)
- Comprehensive OAM
- Multi-service support
- Static or dynamic Provisioning

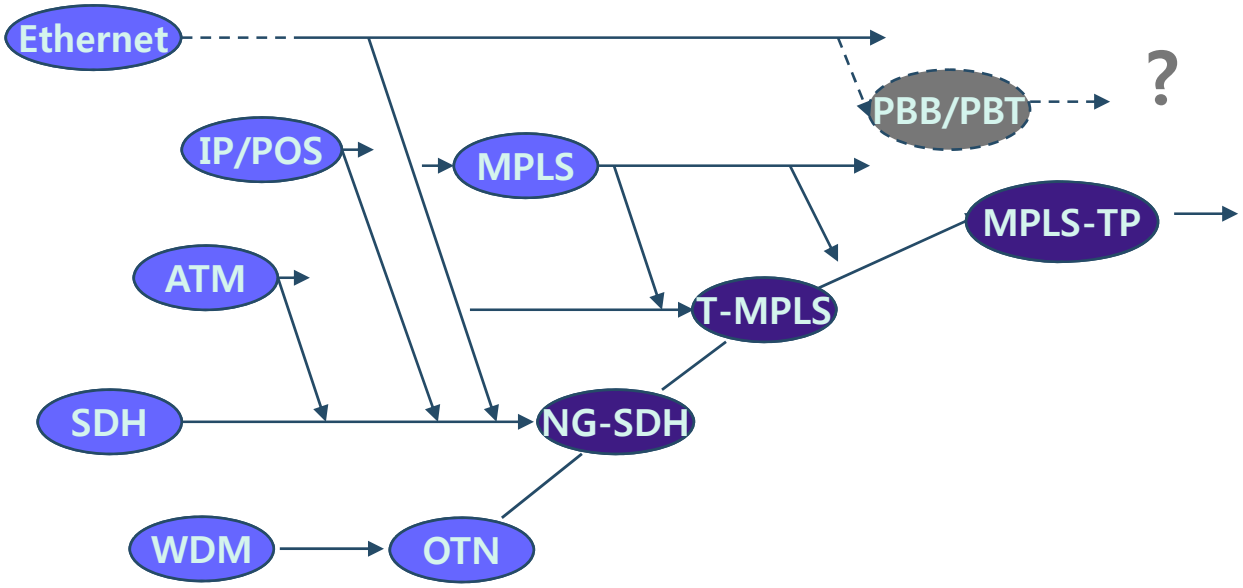


- **Multi-service transport over Packet**
- **Connection Oriented 서비스**
- **Deterministic data plane**
- **Hard QoS**
- **Comprehensive OAM**
- **Network & equipment protection**

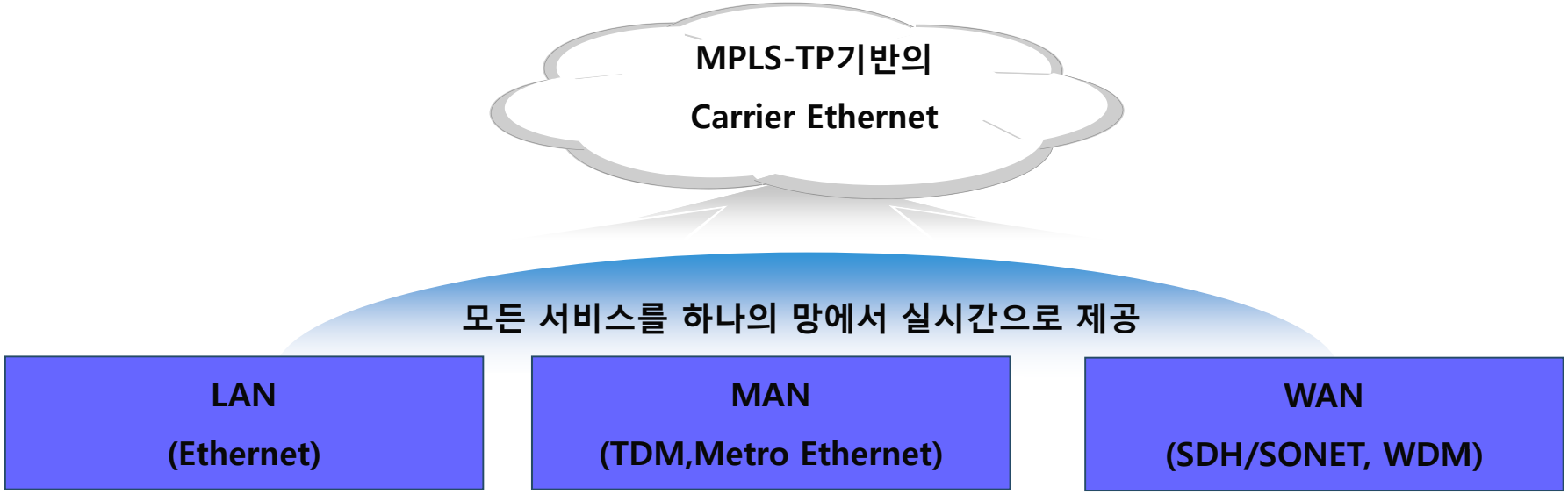
1. MPLS-TP 특징

기술 표준화 History

- MPLS-TP(또는 PTN) 영역의 두 Major 기술
  1. MPLS를 기반으로 발전된 기술
     - MPLS-TE + PWE3 (IETF)
     - T-MPLS (ITU-T)
     - **MPLS-TP (ITU-T & IETF)**
  2. Ethernet을 기반으로 발전된 기술
     - PBB-TE (IEEE)



1. MPLS-TP 특징



➢ Ethernet

- 장점 : 단순구성, 저가의 구축 비용
- 단점 : 확장성 제약, 장애 시 복구 시간 느림

➢PTN(Packet Transport Network)

- 특징 : 확장성, 전송장비와 같은 낮은 Protection, OAM, QoS, 단순구성, 저가의 망 구성
  Ethernet의 장점과 MSPP의 장점을 모두 보유한 Carrier Ethernet 은 향후 모든 네트워크 망을 All IP 네트워크로 구성할 수 있도록 하는 선도적인 솔루션

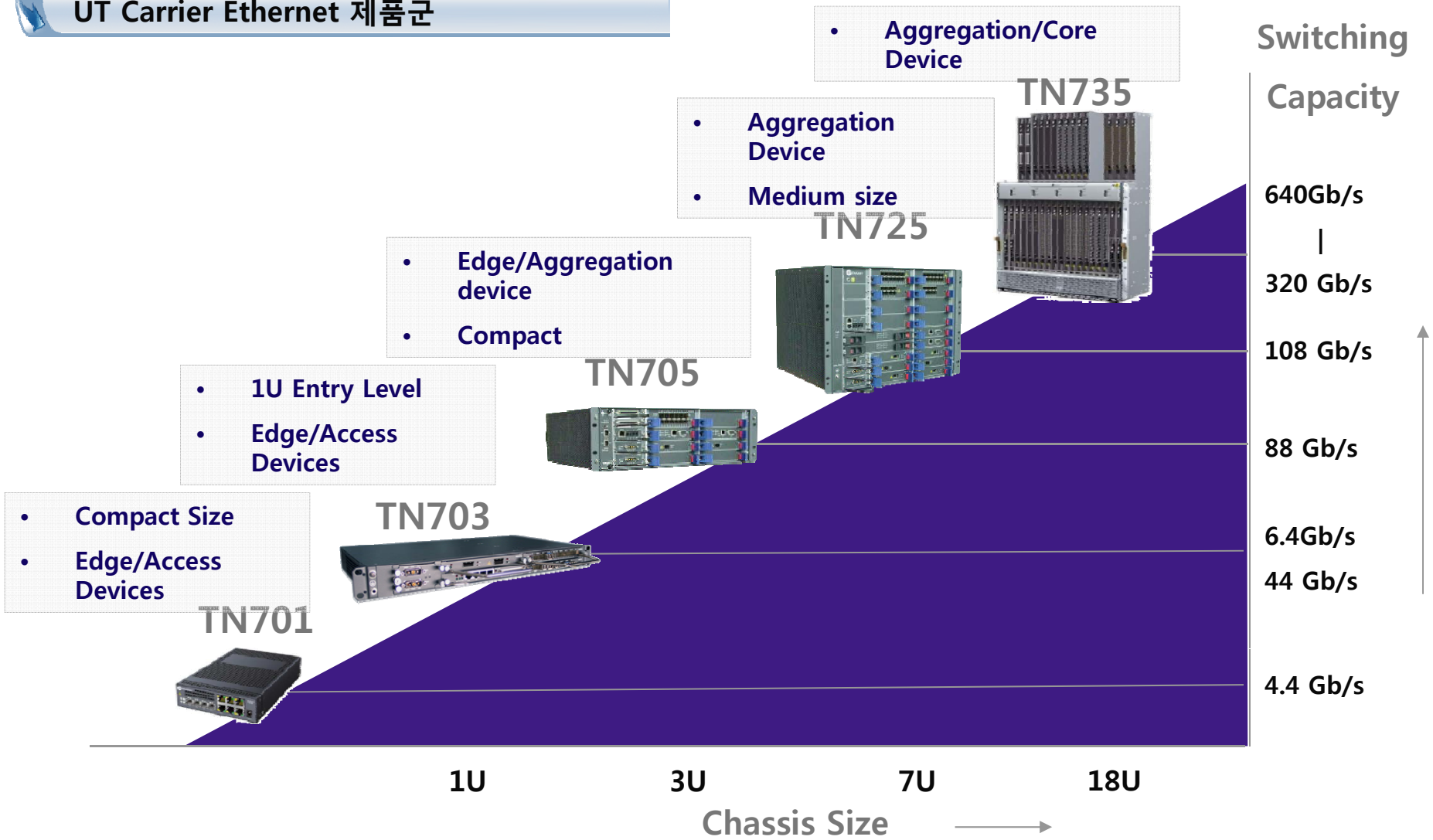
1. MPLS-TP 특징

제품 특성

- MPLS-TP 기반 시스템
- OPEX절감을 위한 설치공간 및 전원 절감 기능
- Packet기반에서의 다양한 TDM 성능 보유
- 뛰어난 Packet기반 구조
- ATM, TDM, and IP over MPLS 지원
- Clock Synchronization의 정확성
- 다양한 Application에 적용할 수 있는 제품 Line-Up 및 지속적인 Roadmap
- Tier-1 사업자를 위한 상용경험 및 안정성

2. 장비 소개

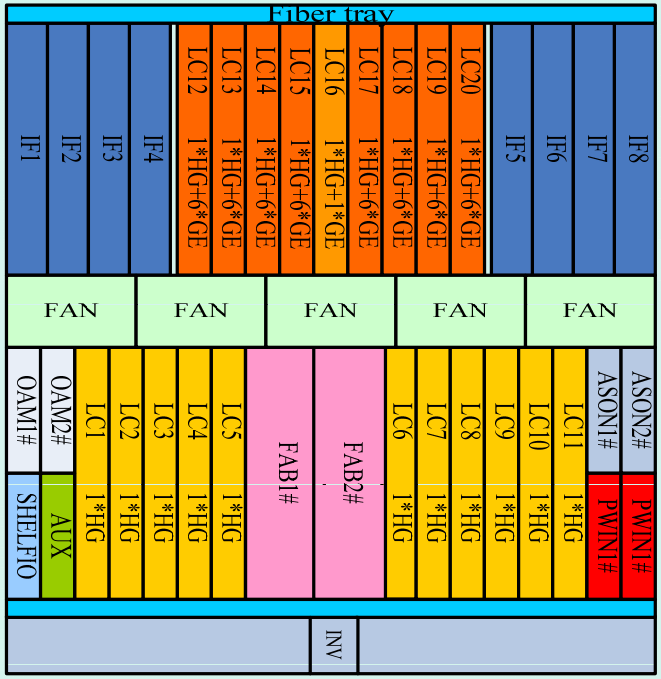
UT Carrier Ethernet 제품군



2. 장비 소개 (TN735)

TN735

- Dimension: 866 x 535 x 280 mm Width x Height x Depth (18.5U)
- 19″/ETSI/ANSI rack mountable
- Typical power consumption: 1,200W



2. 장비 소개 (TN725)

TN725

●System Chassis
- Dimension: 440 x 320 x 410mm (WxHxD)
- 동작온도/습도: 0° ~ 50° , 5%~85%
- 전원: -48V DC
- 소모전력: 480W
- 무게: 43kg

●Switching
- 108G full duplex switching fabric

●Capacity
- 10GE Max. 6 (XFP)
- GE Max. 36port (SFP)
- FE Max. 36port (RJ45+SFP)
- STM-1 Max. 64
- E1/T1 Max. 64

●MPLS-TP
- Max. 8K LSP+PW
- 1:1/1+1 LSP Protection

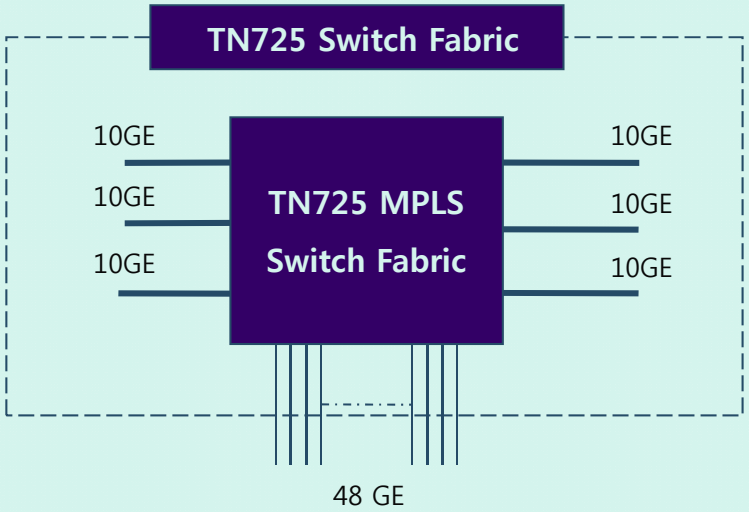
●Topology
- Linear, Star, Ring, Multi-ring

●Service
- Ethernet: E-LINE, E-LAN, E-TREE
- PDH: CEP, SAToP
- SDH: CEP

2. 장비 소개 (TN725)

TN725 (계속)

- **OAM**
  - MPLS OAM: ITU-T Y1711
  - Ethernet service OAM: IEEE 802.1ag and ITU-T Y.1731
  - Ethernet link OAM: IEEE 802.3ah
- **Protection mechanism**
  - 1+1 Power supply, 1+1 Main control(OAM)
  - 1+1 Clock processing unit, 1+1 switch fabric
  - 1:1/1+1 LSP protection
  - LACP for FE/GE interfaces
  - STM-1 1+1 MSP
  - 1:2 E1 Card Failure Protection
- **Timing/Synchronization**
  - FE/GE/10GE Line timing and SSM
  - FE/GE IEEE 1588V2
  - 1pps+tod Time input/output
  - External Timing output
- **QoS**
  - classification
  - Mapping
  - Metering
  - Scheduling: 8 queues per port
  - Congestion management



- 108Gbps Full-Duplex, Non-blocking Ethernet Switching Fabric
- Optimized Asymmetric backplane
- External: 48x GE + 6x 10GE
- Non-blocking structure

2. 장비 소개 (TN705)

TN705

●System Chassis
- Dimension: 440 x 133 x 410mm (WxHxD)
- 동작온도/습도: -10° ~ 50° , 5%~95%
- 전원: -48V DC
- 소모전력: 230W
- 무게: 21kg

●Switching
- 88G full duplex switching fabric

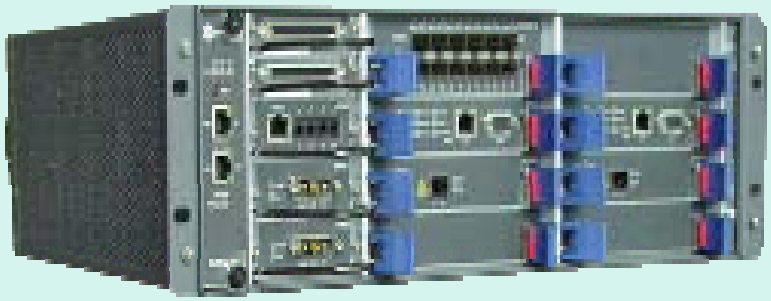
●Capacity
- 10GE Max. 4port (XFP)
- GE Max. 40port (SFP)
- FE Max. 40port (RJ45+SFP)
- STM-1 Max. 8
- E1/T1 Max. 16

●MPLS-TP
- Max. 8K LSP+PW
- 1:1/1+1 LSP Protection

●Topology
- Linear, Star, Ring, Multi-ring

●Service
- Ethernet: E-LINE, E-LAN, E-TREE
- PDH: CEP, SAToP
- SDH: CEP
- ATM: ATM over MPLS

●Timing/Synchronization
- FE/GE/10GE Line timing and SSM
- FE/GE IEEE 1588V2
- 1pps+tod Time input/output
- External Timing output



2. 장비 소개 (TN703E)

TN703E

●System Chassis

- Dimension: 440 x 44.5 x 245mm (WxHxD)
- 동작온도/습도: -10° ~ 50° , 5%~95%
- 전원: -48V DC
- 소모전력: 65W
- 무게: 4.6kg

●Switching

- 44G full duplex switching fabric

●Capacity

- 10GE Max. 2 (XFP)
- GE Max. 22port (SFP)
- FE Max. 22port (RJ45+SFP)
- STM-1 Max. 2
- E1/T1 Max. 48

●MPLS-TP

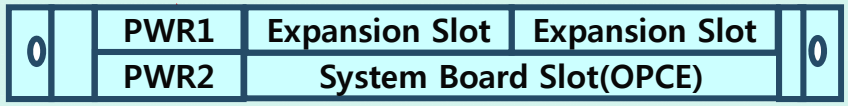
- Max. 1K LSP+PW
- 1:1/1+1 LSP Protection

●Topology

- Linear, Star, Ring, Multi-ring

●Service

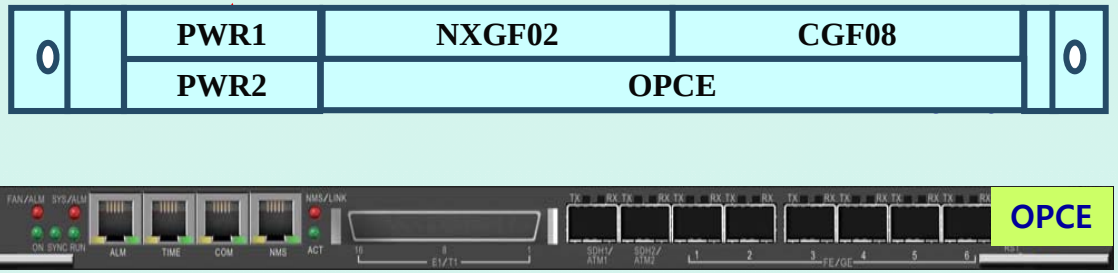
- Ethernet: E-LINE, E-LAN, E-TREE
- PDH: CEP, CESoPSN, ML-PPP
- SDH: CEP



2. 장비 소개 (TN703E)

TN703E (계속)

- **OAM**
  - MPLS OAM: ITU-T Y1711
  - Ethernet service OAM: IEEE 802.1ag and ITU-T Y.1731
  - Ethernet link OAM: IEEE 802.3ah
- **Protection mechanism**
  - 1:1/1+1 LSP protection
  - LACP for FE/GE interfaces
  - STM-1 1+1 MSP
- **Timing/Synchronization**
  - FE/GE/10GE Line timing and SSM
  - FE/GE IEEE 1588V2
  - 1pps+tod Time input/output
  - External Timing output
- **QoS**
  - classification
  - Mapping
  - Metering
  - Scheduling: 8 queues per port
  - Congestion management



•OPCE: 6xGE/FE+16xE1/T1+2xSTM-1

NXGF02

•NXGF02: 2x10GE

CGT08

•CGT: 8xGE/FE (RJ-45)

CGF08

•CGF: 8xGE/FE (SFP)

CGF02E16

•CGF02E16: 2xGE/FE(SFP)+16xE1/T1

2. 장비 소개 (TN703C)

TN703C

●System Chassis
- Dimension: 440 x 44.5 x 245mm (WxHxD)
- 동작온도/습도: -10° ~ 50° , 5%~95%
- 전원: -48V DC, 220/110V AC
- 소모전력: 27W
- 무게: 4.6kg

●Switching
- 6.4G full duplex switching fabric

●Capacity
- GE Max. 4port (SFP)
- FE Max. 20port (RJ45+SFP)
- E1/T1 Max. 16

●MPLS-TP
- Max. 512 LSP+PW
- 1:1/1+1 LSP Protection

●Topology
- Linear, Star, Ring, Multi-ring

●Service
- Ethernet: E-LINE, E-LAN, E-TREE
- PDH: CEP

O		PWR1	Expansion Slot	Expansion Slot		O
		PWR2	System Board Slot(OPCE)			

•OPCE: 4xGE+4xFE+16xE1/T1

•CFT08C/CFF08C: 8xFE(TX/FX)

●OAM
- MPLS OAM: ITU-T Y1711
- Ethernet service OAM: IEEE 802.1ag and ITU-T Y.1731
- Ethernet link OAM: IEEE 802.3ah

●Protection mechanism
- 1:1/1+1 LSP protection
- LACP for FE/GE interfaces

●Timing/Synchronization
- FE/GE Line timing and SSM
- FE/GE IEEE 1588V2
- 1pps+tod Time input/output
- External Timing output

●QoS
- Classification / Mapping / Metering / Scheduling

2. 장비 소개 (TN701-A)

TN701

- **System Chassis**
  - Dimension: 230 x 40 x 150mm (WxHxD)
  - 동작온도/습도: -40° ~ 65° , 5%~95%
  - 전원: DC12V, AC/DC adapter
  - 소모전력: 20W
  - 무게: 2.6kg
- **Switching**
  - 4.4G full duplex switching fabric
- **Capacity**
  - GE Max 4port (SFP)
  - FE Max 4port (RJ45)
- **MPLS-TP**
  - Max. 256 LSP+PW
  - 1:1 LSP Protection
- **Topology**
  - Linear, Star, Ring, Multi-ring
- **Service**
  - Ethernet: E-LINE, E-LAN, E-TREE

- **OAM**
  - MPLS OAM: ITU-T Y1711
  - Ethernet service OAM: IEEE 802.1ag and ITU-T Y.1731
  - Ethernet link OAM: IEEE 802.3ah
- **Protection mechanism**
  - 1:1 LSP protection
  - LACP for FE/GE interfaces
- **QoS**
  - classification
  - Mapping
  - Metering
  - Scheduling: 8 queues per port
  - Congestion management

2. 장비 소개 (TN701-B)

TN701

●System Chassis
- Dimension: 250 x 44 x 190mm (WxHxD)
- 동작온도/습도: 40° ~ 65° , 5%~95%
- 전원: AC 90V~240V input
- 소모전력: 100W(max)

●Switching
- 10G full duplex switching fabric

●Capacity
- GE Max 2port (SFP)
- FE/GE with PoE 8port (RJ45)

●MPLS-TP
- Max. 256 LSP+PW
- 1:1 LSP Protection

●Topology
- Linear, Star, Ring

●Service
- Ethernet: E-LINE, E-LAN, E-TREE

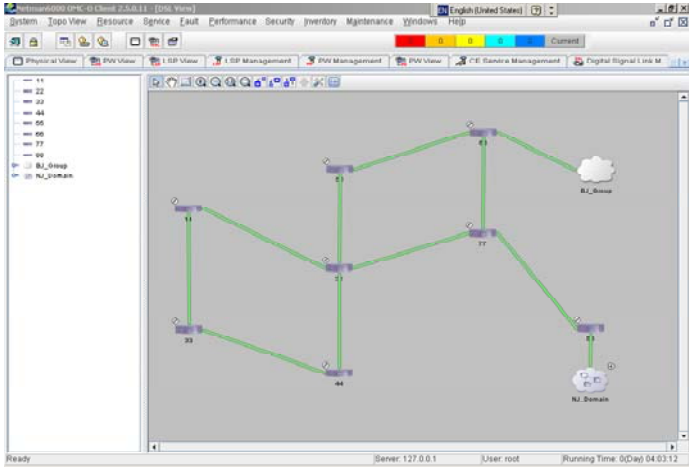
●OAM
- MPLS OAM: ITU-T Y1711
- Ethernet service OAM: IEEE 802.1ag and ITU-T Y.1731
- Ethernet link OAM: IEEE 802.3ah

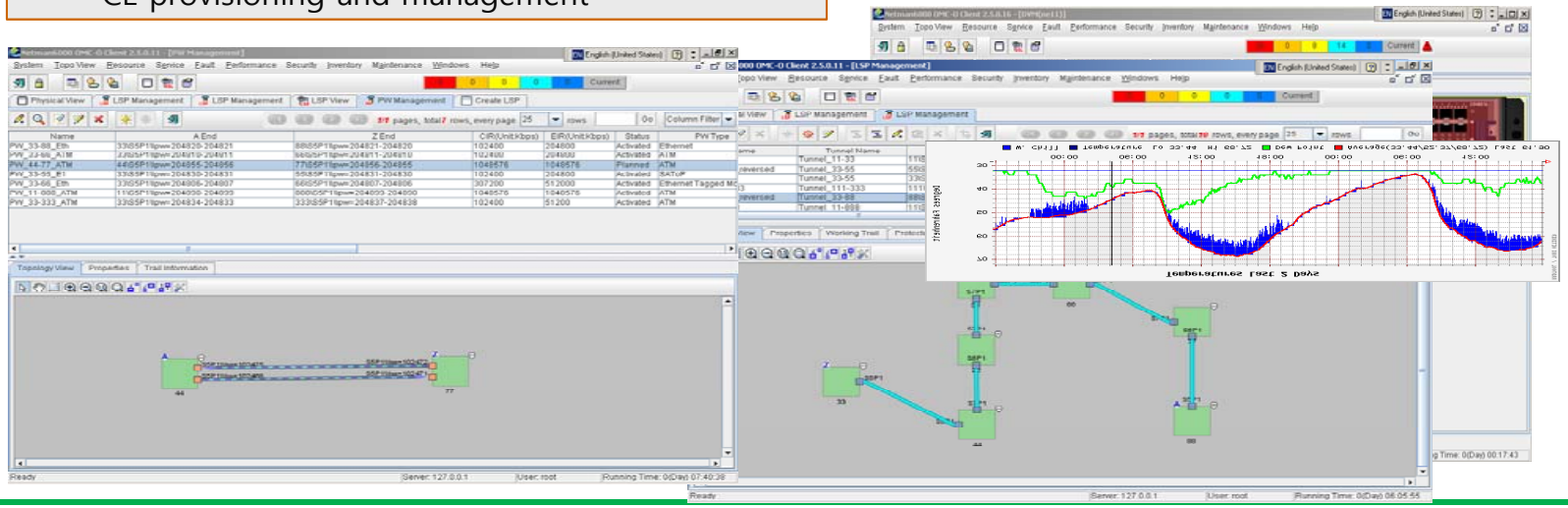
●Protection mechanism
- 1:1 LSP protection
- LACP for FE/GE interfaces

2. 장비 소개 (EMS)

EMS

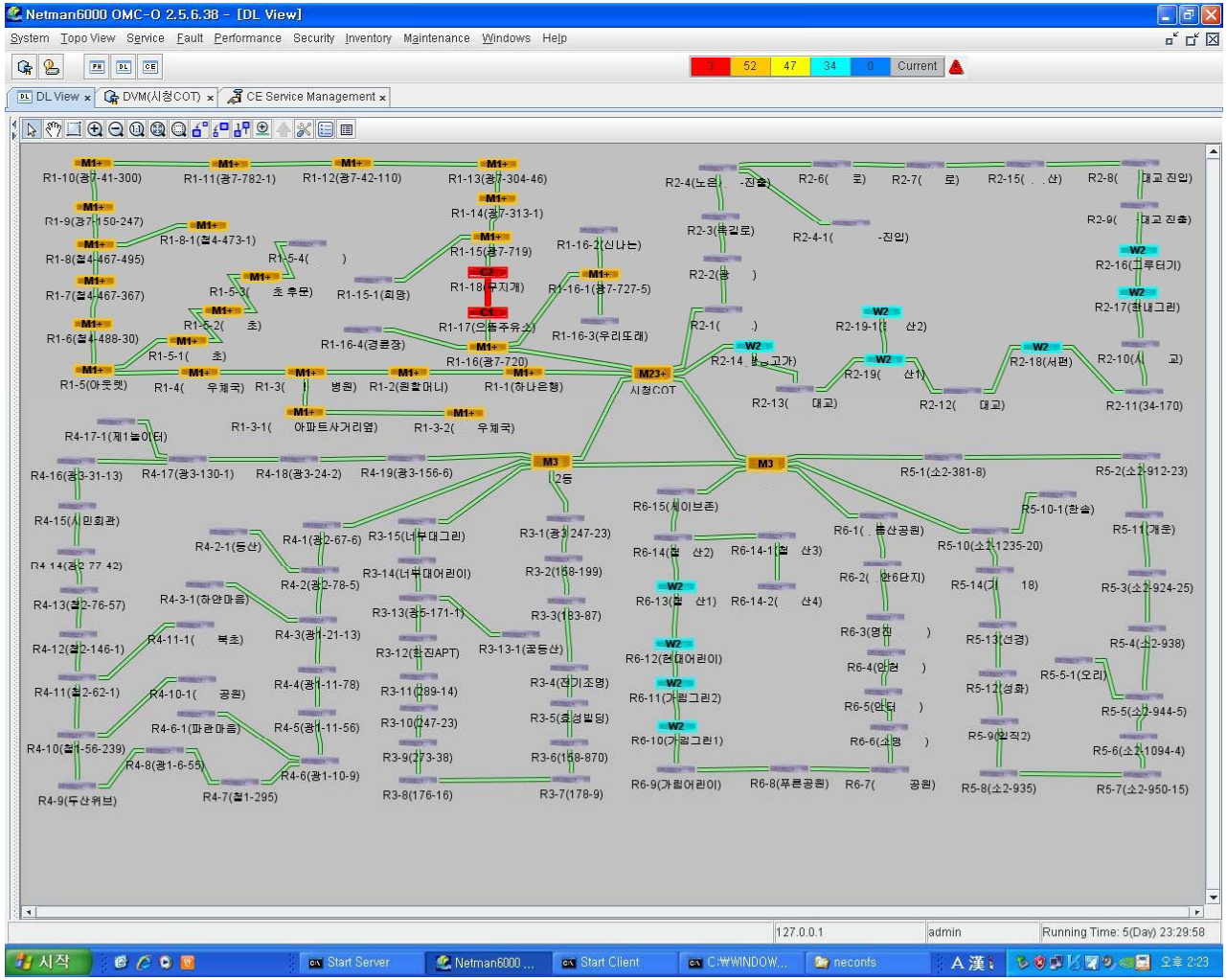
- **Topology management**
  - Network Topology View/ Sub network & Group
  - Topology fault monitoring/topology operation
- **Device management**
  - Shelf view, equipment management
  - Alarm, performance, service management
- **e2e service provisioning &management**
  - LSP provisioning and management
  - PW provisioning and management
  - CE provisioning and management





3. 구축 사례

K시 서비스망

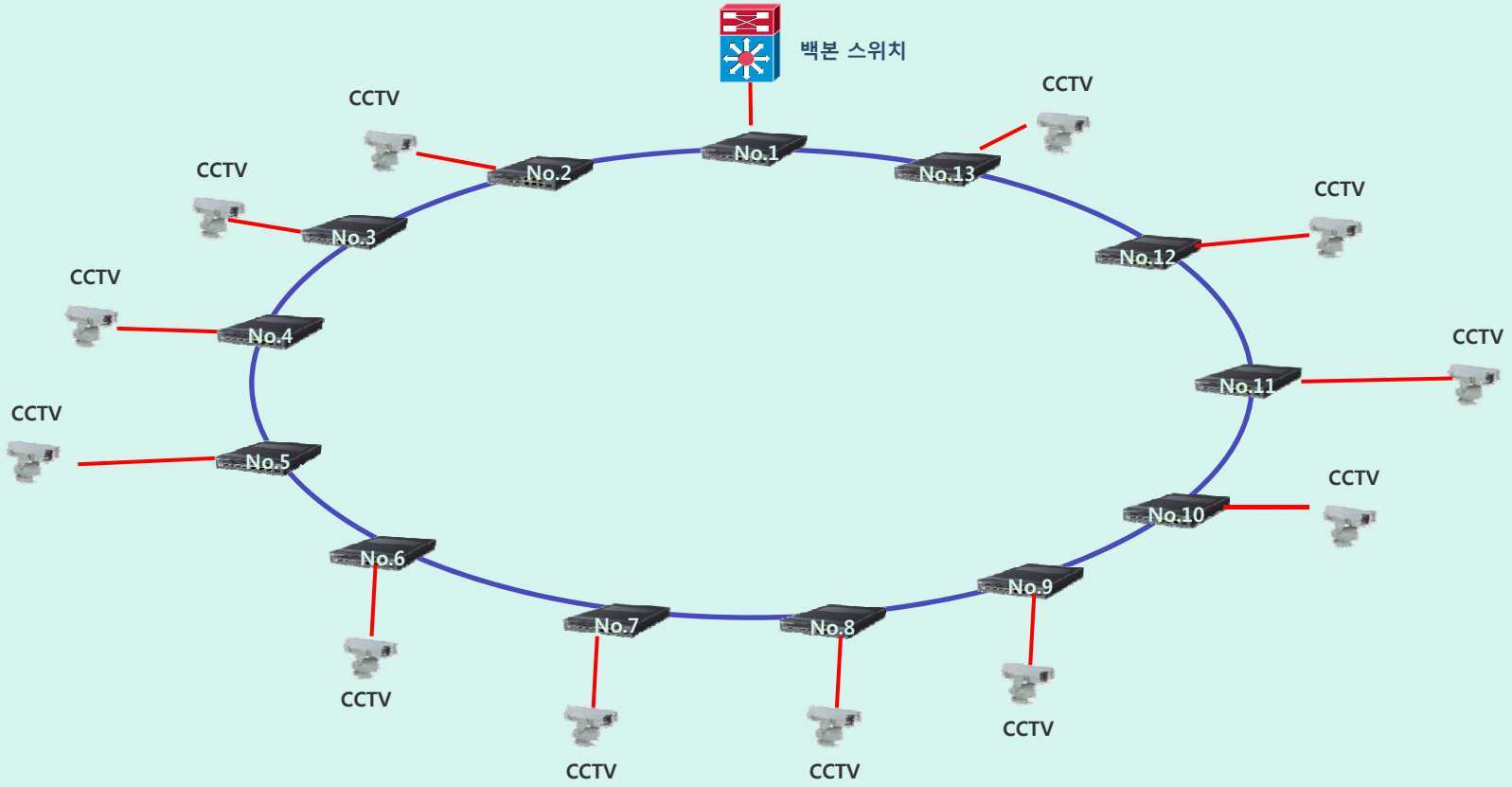


3. 구축 사례

H시 U-city 1차 구축

1차 구축 : TN701 13개 노드 '2014년 상반기 구축 완료 예정'

2차 구축 : (2015년 말 까지 220개소 확장 진행 중)



UTSTARCOM

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기술/영업 문의

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